The Climate Institute

Managing the Unavoidable while Avoiding the Unmanageable

Climate policy tests for the 2013 federal election

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Policy Brief

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The Climate Institute

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Introduction

Every Federal election, The Climate Institute undertakes a qualitative assessment of the climate change policy position of political parties and independents represented in the Parliament. The Institute bases this assessment on our analysis of what is required for Australia to contribute to effective global climate change solutions and build a prosperous, resilient economy and society.

This policy brief explains the rationale for our 2013 Federal election policy tests.

This Federal election is critical to Australia's economic and climate future. The next Government will determine whether Australia will:

1. **Help or hinder global solutions to climate change**: This will in large part be determined by our ability to meet international commitments to do our fair share to reduce global greenhouse gas emissions and help the poorest countries adapt to an increasingly hostile climate and invest in low carbon development pathways. Both of these elements will influence the positive or negative role Australia could play in current negotiations to finalise a global agreement in 2015 that will cover emission commitments from all major economies.

2. **Continue the historic decline in domestic emissions and accelerate low carbon investment**: Driven by global trends and domestic policies like renewable targets and carbon prices, pollution from some of Australia's largest emission sources have begun to decline. Positive global trends in clean energy technology and increasing scrutiny of the risks associated with investments in high carbon assets are among the global mega-trends that leave our economy exposed in the real world of significant, if insufficient, action to price and constrain carbon emissions.

3. **Boost preparations for unavoidable extreme weather and other climate impacts**: Agencies such as the World Bank, the IMF and the International Energy Agency are increasingly warning that climate change threatens to reverse gains made over decades of economic and social development. We no longer live in the relatively safe climate enjoyed by our ancestors. Even if we achieve more urgent and ambitious action now, our climate will get more hostile with the dangerous levels of greenhouse gases already in the atmosphere. How well we prepare for our increasingly unsafe climate will influence the health and wellbeing of Australians and our economic systems. It will determine the extent to which we can minimise the suffering of unavoidable impacts.

Australia is faced with a challenge to manage the unavoidable and avoid the unmanageable. To be credible, let alone strong and effective, 2013 climate election policies will need to:

1	**Cut Carbon Pollution**
2	**Accelerate Low Carbon Investments**
3	**Prepare for Climate Impacts**

"…climate change is real and there's no point denying the consequences of a changing climate. We are living through climate change. We know it and we can see it… we've needed to take tough decisions like putting a price on carbon so we do seize the clean energy sources of the future"

Julia Gillard Prime Minister
ALP Candidates Conference
3 February 2013

"… in the Coalition we believe now, as we did back in 2007, that climate change is real, that humanity does make a contribution and that you need a strong and effective policy to deal with it."

Tony Abbott Leader of the Opposition
National Press Club
31 January 2013

Summary

Policy Benchmarks

Cut Carbon Pollution

+ Can the policy achieve a net 25 per cent reduction in emissions below 2000 levels by 2020 and around a net 60 per cent reduction below 2000 levels by 2030?

+ Does the policy include immediate ratification of the second commitment period of the Kyoto Protocol and an independent domestic review mechanism to increase ambition of this target in 2014?

+ Does the policy include a plan to scale up public and private sector financing of poor developing nations each year to 2020, including a transparent public climate finance allocation of at least $350 million in 2014–15?

Accelerate low carbon investment

+ Does the policy establish a clear long-term carbon price signal or penalty consistent with sustained structural adjustment from high emission to low emission technologies in major emitting sectors?

+ Does the policy provide stability for renewable energy investment and ensure at least 41,000 GWh of large-scale renewable energy generation by 2020?

+ Does the policy include market mechanisms, regulations or incentives to boost 2010 energy productivity levels by 30 per cent by 2020?

+ Does the policy require transparency from listed companies and institutional investors with respect to the emissions profile of their assets and/or portfolios, and their exposure to the physical, regulatory and other climate-related risks?

Prepare for climate impacts

+ Does the policy recognize the climate risks under 2- and 4-degree warming scenarios? Are these climate risks being introduced into all appropriate national policies, standards, targets and oversight?

+ Does the policy require private-sector proponents or owners of infrastructure—especially those seeking Commonwealth approval or funding—to disclose how their assets and interdependencies will manage climate risks under 2 and 4 degrees of warming?

+ Does the policy establish the Commonwealth as a leader in climate risk management, in particular by (a) requiring all federal agencies to publish reports on their climate risk readiness 2 and 4 degrees warming scenarios; and (b) maintaining a national body with responsibility for the coordination and public sharing of adaptation research?

Cut Carbon Pollution

To avoid dangerous climate change the total amount of greenhouses gases, or carbon pollution, that can be released is finite. Only around 1,500 billion tonnes of greenhouse gases[1] can be emitted to 2050 if we are to have reasonable chance of avoiding a 2°C increase in mean global temperature.[2]

Recent extremes of weather demonstrate our vulnerability to even relatively small shifts in the global climate. Current average global temperatures are around 0.8°C above preindustrial levels and a 1.4°C is almost certainty locked into the climate system.

Climate experts describe the effect of that warming as "putting our weather on steroids"; turning Australia's already moody climate hostile. Warming of above 2°C would exceed the adaptive capacity of many national and economic systems and take an ever-greater economic and social toll (Table 1). This is why the Australian Government has said it is in the national interest to avoid 2°C warming, and joined the United States, China and over 190 other countries in an international commitment to avoid this increase in mean global temperature.

Both major political parties have committed to reduce emissions by 5–25 per cent of 2000 levels by 2020. Targets greater than the "unconditional" 5 per cent are defined by the level of international action. Both parties support avoiding a 2°C increase in global temperature and the ALP has also committed to reduce emissions by 80 per cent by 2050.

Under the Government's policy, the principal mechanism to achieve national targets is through a declining limit or cap on around 60 per cent of national emissions. Stronger limits than the default minimum 12 million tonnes reduction per year may be implemented in 2015 following advice from the independent Climate Change Authority.

The Coalition's policy has no enforceable limit on pollution from major emitters but has a policy of unspecified penalties for pollution above "business as usual".

Based on the bipartisan minimum 2020 targets and the Government's 2050 target, Australia's total emissions (i.e. carbon budget) to 2050 would be around 15 billion tonnes.[3] In a world limiting emissions consistent with avoiding a 2°C in global temperature, this would see Australians emit, on average, four times as much as others. If, on the other hand, the average Australian were to consume no more of the global carbon budget than the average person in other developed economies then, over the next 40 years, we can only release around 8 billion tonnes carbon pollution. At current emission levels this budget would be consumed in about 15 years.

This illustrates a critical point: emission reduction requirements will not end in 2020. The post-2020 legally binding agreement, which will cover commitments from all major emitters, is to be agreed in 2015. Australia's post-2020 targets will have to be stronger than its current 2020 ones.

The Climate Institute and, separately, Professor Ross Garnaut,[4] have suggested that a fair contribution to avoiding a 2°C increase in mean global temperature requires Australia to reduce emissions by a net 25 per cent by 2020 and a net 60 per cent below 2000 levels by 2030.

Table 1: The projected impacts of a 2- and 4-degrees mean temperature rise on Australia (Adapted from Pearman (2009), report for the Treasury)[5]. Note that impacts will not occur in isolation and will interact. For example, loss of natural systems will impact on agriculture and infrastructure (e.g. loss of coastal protections provided by coral reefs and mangroves impacting on settlements and infrastructure).

	Natural systems	Water	Coastal	Agriculture	Health	Infrastructure	International security
2 degree world	Significant loss of species, **adaptive capacity exceeded**	Significant water shortages. Significant adaptation required to ensure that reliable supplies are maintained in major cities. **Natural coping capacity exceeded.**	Loss of some coast developments due to coastal erosion and storm surges (in absence of sea walls).	Reduced production	Increase extreme events such as heatwaves and bushfires. Changes maybe within the coping capacity of public health services with additional expenditures.	Coping capacity adequate (with investment)	Increased demand for humanitarian aid and disaster response. Tens of millions threatened by coastal flooding.
4 degree world *(current minimum pathway)*	Massive loss of species	Dangerous water shortages, **adaptive capacity exceeded**	Massive consequence for coastlines, deglaciation of Greenland.	Ability to meet Australian food demand stretched, **adaptive capacity in serious doubt**	Major risks to human life. **adaptive capacity in serious doubt**	Serious exposure to impacts, **adaptive capacity in serious doubt**	**Trade and monetary systems disrupted impeding development.** Increased aid needed as social order breaks down in some regions. Hundreds of millions threatened by coastal flooding.

Australia's commitments should include the use of international trading to cost-effectively meet our contribution to global action. While domestic transformation is critical (see next section), without international trading our contribution to global emission reductions would almost certainly be diminished and the costs of achieving emission commitments would increase.

Policy benchmark. *Can the policy achieve a net 25 per cent reduction in emissions below 2000 levels by 2020 and around a net 60 per cent reduction below 2000 levels by 2030?*

Under the Kyoto Protocol, the Australian Government, supported by the Opposition, has also taken on a second minimum legally binding commitment to constrain emissions between 2013 and 2020. The process of ratification is underway but cannot be formally completed until after the election.

Australia also agreed to review the reduction targets in this commitment in 2014 with a view to increasing ambition up to the equivalent of a 25 per cent reduction by 2020. This timetable coincides with the release of a report by the independent Climate Change Authority on Australia's emission targets and budgets, and setting of the emissions cap under the domestic carbon laws.

Policy benchmark. *Does the policy include immediate ratification of the second commitment period of the Kyoto Protocol and an independent domestic review mechanism to increase ambition of this target in 2014?*

Australia's contribution to avoiding dangerous climate change does not stop with reducing emissions. It is in Australia's national interest to contribute its fair share to public and private sector climate financing. Climate change poses a substantive threat to peace and security in the Asia-Pacific region and worldwide.[6] Climate finance facilitates adaptation within neighbouring developing countries, many of which are among the most vulnerable to climate change. Climate finance also builds confidence that developed nations will honour the commitments they have made. This is necessary to build support for the legally binding global agreement to be agreed in 2015. Finally, finance can help overcome the many barriers that exist to private sector investment in low carbon technologies in poorer nations.

Along with other industrialized countries, Australia has committed to the global goal to scale up finance for climate mitigation and adaptation in developing countries: to US$100 billion a year from public and private funds by 2020. Private and innovative funds could be based on the carbon markets, removal of fossil fuel subsidies and emission levies on international shipping and aviation.

At the Doha climate talks last year, it was agreed that industrialised nations would prepare a strategy to make this goal a reality. This will be the subject of a Ministerial Roundtable at the Warsaw UN climate talks starting 11 November 2013. Australia's allocation to international public sector international climate finance over the period 2010–2012 was $599 million.[7]

Based on our share of global emissions and the size of our economy, studies have calculated Australia's fair share of global climate finance at between 2 and 4 per cent.[8] To build on the good investment over the 2010-2012 period and demonstrate a trajectory consistent in scale with Australia's fair share of international climate finance commitments, it is essential that Australia's next allocation of funding for climate finance be no less than $350 million per annum for the next four years.

Policy benchmark. *Does the policy include a plan to scale up public and private sector financing of poor developing nations each year to 2020, including a transparent public climate finance allocation of at least $350 million in 2014–15?*

Cutting carbon pollution policy benchmarks:

1. **Can the policy achieve a net 25 per cent reduction in emissions below 2000 levels by 2020 and around a net 60 per cent reduction below 2000 levels by 2030?**

2. **Does the policy include immediate ratification of the second commitment period of the Kyoto Protocol and an independent domestic review mechanism to increase ambition of this target in 2014?**

3. **Does the policy include a plan to scale up public and private sector financing of poor developing nations each year to 2020, including a transparent public climate finance allocation of at least $350 million in 2014–15?**

Accelerate Low-Carbon Investment

Australia has not been well prepared to remain competitive in a world moving into a low-carbon era. Our nation's highly polluting power sector, economic dependence on emission-intensive exports, inefficient use of energy, and extraction of natural capital will become economic liabilities as the world moves to limit carbon and related pollution.

The global boom in clean energy investment in recent years has already reduced the cost of renewable energy here and abroad. While the precise future value of global carbon prices is obviously uncertain, prices will inevitably climb requiring our industries and economy to manage long-term exposures to higher global carbon liabilities. Changing patterns in the trade in energy commodities also means we are not isolated from global trends. For example, existing policies and those being developed are expected to cut global coal demand by 20 per cent by 2020.[9] The investment community and Central Banks are increasingly looking to the financial and economic the risks of high carbon investments.[10]

In short, the transition to a low-carbon global economy is unavoidable. The competitiveness of carbon-intensive economies depends on the degree to which they can adapt to this new reality.[11]

The combination of the carbon pricing, the Renewable Energy Target (RET) and energy efficiency measures is having an impact on Australia's emissions profile. These policies are contributing to a decline in electricity demand and an even steeper decline in electricity emissions, by increasing the competitiveness of renewables and gas generators at the expense of coal generation.[12]

A carbon price or a pollution penalty makes businesses take responsibility for their emissions and rewards those who invest in efficiency, clean energy and other low pollution options.

Alongside other policies such as the Carbon Farming Initiative, the price ensures Australia will reduce its economic dependence on pollution by making new clean technologies relatively cheaper.

In some cases, a portion of the price will be passed on to consumers and energy users. Experience shows that, over time, this will encourage behavioural change and lead to lower emissions.[13]

Carbon pricing can also be used to raise revenue for investments in low pollution options that will not be strongly supported by carbon pricing, support a fair transition to the low carbon economy (e.g. through support low income groups) and help drive global climate solutions (e.g. carbon markets and climate finance). To illustrate, in the current carbon package, substantial carbon revenues are directed towards supporting clean energy, energy efficiency and building low carbon solutions in regional Australia.

Table 2 outlines the results of recent independent assessment of the impact of long-term carbon pricing in Australia. Broadly speaking, these studies indicate that, in combination with the RET, carbon prices in the order of $30/tonne by 2020 and $60/tonne by 2030 would lead to significant and sustained restructuring of the economy generally and the electricity sector in particular. They also indicate that the removal of carbon pricing would substantially increase emissions from the power sector in the short term as the most emission-intensive power sources become regain competitiveness compared to cleaner sources of electricity.

If policies like the RET are removed or weakened the carbon price will have to be raised substantially to achieve the required economic transformation. If the carbon price is removed policies like the RET and others will have to be significantly increased to meet target commitments.

Table 2: Carbon prices and their impact on the transformation of the Australian economy.[14]

	Carbon price assumption (2020)	Carbon Price assumption (2030)	Structure and emission impact
Treasury (2011) (Real $2010, Economy wide modelling, modelling extends to 2050)	$29/tonne	$53/tonne	8 per cent reduction in the emission intensity of the economy in 2020 (46 per cent reduction in 2050)
	$62/tonne	$112/tonne	20 per cent reduction in the emission intensity of the economy in 2020 (68 per cent reduction in 2050)
Climate Change Authority/SKM MMA (2012) (Real $2012, Electricity sector only including existing RET)	$13/tonne	$55/tonne	Brown coal generation declines over the longer term.
	$31/tonne	$55/tonne	Brown coal generation declines over the longer term. Reduction in emissions of 12 million tonnes below scenario with lower carbon price.
	$0/tonne	$0/tonne	Little renewable generation development post 2020. Increase in emissions of 134 million tonnes above scenario with carbon price.
RepuTex (2013) (Assumes removal of carbon pricing mechanism as per Coalition policy. Electricity sector only)	$0/tonne	N/A	Natural gas generation falls by over 60 per cent by 2020. Total share of brown coal generation remains around 24 per cent rather than declining. Carbon emissions grow by 4 per cent instead of falling by around the same amount to 2020 due to reduced brown coal output.
University of NSW (2013) (Assesses least cost options for supplying the Australian National Electricity Market with 100 per cent renewable electricity)	N/A	$0-$100/tonne	At moderate carbon prices of around $50–$65/tonne a 100 per cent renewable electricity system would be cheaper on an annual basis than a fossil-fuel-based system.

The Government's current policy is that Australia's carbon price will be strongly linked to global carbon markets[15], in particular in Europe. Current forecasts suggest this will deliver carbon prices averaging around $10/tonne (range $3.40-$16.60) over the period to 2020[16] and up to $39/tonne at that time.[17] The Coalition includes an unspecified carbon penalty for companies that exceed unspecified emission baselines in its policy. The size and forward trajectory of the penalty, how baselines are set and potential the role of offsetting mechanisms will be critical to its impact on low carbon investments.

Policy benchmark. *Does the policy establish a clear long-term carbon price signal or penalty consistent with sustained structural adjustment from high emission to low emission technology in major emitting sectors?*

Over the last decade Australian industry and business have experienced a climate and energy policy environment of continuous disruption. This has been particularly difficult and costly for the energy sector, the long-lived assets of which demand a reasonable degree of policy predictability.

For example, while the Renewable Energy Target has helped to fuel investment of $10 billion in renewable energy since 2009, and has the potential to drive additional investment of $19 billion by 2020, repeated reviews and amendments to the scheme have resulted in stop-start industry development.

Further uncertainty and/or changes to the scheme to 2020 would damage the viability and competitiveness of Australia's emerging clean energy industry. Reduced early investment in renewable energy generation also risks higher electricity costs to consumers, who have to pay for extra fuel and carbon costs, as well as for the costs of uncertainty expressed as higher risk premiums.[18]

In line with the recommendations of the independent Climate Change Authority (that the cost outweighed the benefits of changing the RET), the ALP's policy is to keep the current 41,000 GWh large-scale target and remove the legislated 2014 review of the scheme. The Coalition has not yet stated its support for the 41,000 GWh large-scale renewable energy target and stated it will review the level of target again in 2014. Without bipartisan support for the 41,000 GWh target and the removal of the 2014 review, renewable energy investment in Australia will remain stalled until 2015 at least.

Policy benchmark. *Does the policy provide stability for renewable energy investment and ensure at least 41,000 GWh of large-scale renewable energy generation by 2020?*

Energy plays a significant role in the economy as a major factor in production. The efficient use of energy can therefore contribute positively to economic growth. Energy productivity, which is defined as GDP per unit of energy used, has increased over time for many countries and is higher in countries which appreciate the benefits of extracting as much economic value from every unit of energy used.

Overall, the failure to maximize our energy productivity imposes needless costs throughout the economy and reduces Australian competitiveness. Decoupling productivity from energy consumption becomes even more important in a world limiting pollution: it reduces emissions from existing polluting energy sources *and* reduces the amount of clean energy investment needed to achieve climate goals.

Energy efficiency is a key driver of energy productivity. However, Australia's approach to energy saving is patchy, and our energy efficiency is not improving at rates similar to comparable economies. For example, analysis by ABARES found that over the period 1990 to 2004, energy efficiency improvements contributed to improved energy productivity by 0.4 per cent per year, around half that of in the United States and Canada.[19]

Analysis by ClimateWorks of data provided by energy users that represent around 50 per cent of Australia's total energy consumption found that industry has identified energy savings worth around $3.3 billion per year. Most of these investments would pay for themselves in less than two years. However, less than half of the energy savings, worth $2.1 billion, are likely to be implemented, due to a range of institutional barriers that could be addressed by policy support. [20] Similar results have been found in the residential and commercial sectors.[21]

Alongside carbon pricing, a range of policies are needed to make a step-change in Australian energy productivity. Important flagship policies include a nationally consistent energy savings initiative with a strong national target and 'top runner'[22] minimum energy performance standards for appliances and vehicles. Neither a national energy efficiency target or policies that could achieve a step change in energy efficiency are currently supported by either major party.

Policy Benchmark. *Does the policy include market mechanisms, regulations or incentives to boost 2010 energy productivity levels by 30 per cent by 2020?*

To prevent global temperatures from rising more than 2°C, there is a finite amount of fossil fuels that can be burnt. In the absence of carbon capture and storage technologies, this global carbon 'budget' is a mere 20 - 40 per cent of fossil fuel reserves on the books of listed companies. [23]

If as little as 20 per cent of known fossil fuel reserves have economic value, there will be a significant negative impact on the value of companies and their investors. Australian analysis based on this approach

reveals much of the investment in Australian coal rests on a similar speculative bubble (see Figure 1 below).[24] Greater transparency of companies and fiduciary investors, such as superannuation funds, is required to enable informed investment decisions.

At the company level, little carbon-related data was even understood before the advent of the Carbon Disclosure Project in 2003 that asked the world's largest companies to provide information on their emissions and emissions reduction strategy. Legislation is growing rapidly worldwide to force companies to disclose their emissions and this is already in place in Australia. However, there is very little information regarding the emissions *potential* of the fossil fuel reserves and resources held by companies.

Given the clear materiality of carbon and climate change related information to many businesses, especially capital-intensive ones exposed to inevitable carbon regulation over coming decades, a clear policy on reporting guidelines in this area to assist companies in their desire to keep the market informed of relevant information is required. This would include the emissions and emissions reductions strategies but also the emission potential of reserves and resources and carbon price assumptions used in their assessment of ongoing capital expenditure.

Many companies are already aware of the material risk to their business that climate change represents, but have failed to disclose this information to the market. In the absence of clear guidance, many companies will continue to withhold this information.

Policy benchmark. *Does the policy require transparency from listed companies and institutional investors with respect to the emissions profile of their assets and/or portfolios, and their exposure to physical, regulatory and other climate-related risks?*

Accelerating low carbon transformation policy benchmarks:

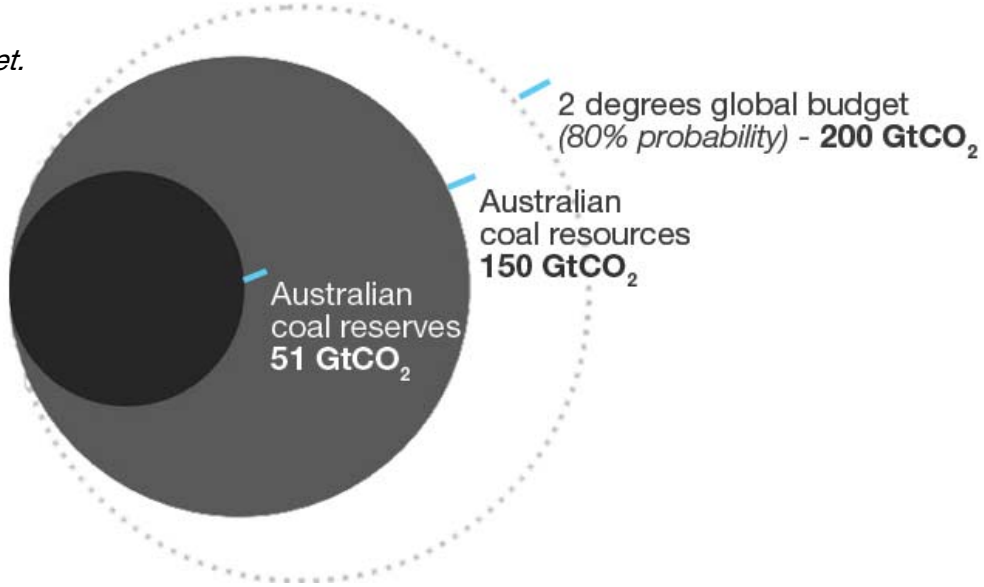
1. **Does the policy establish a clear long-term carbon price signal or penalty consistent with sustained structural adjustment from high emission to low emission technology in major emitting sectors?**

2. **Does the policy provide stability for renewable energy investment and ensure at least 41,000 GWh of large-scale renewable energy generation by 2020?**

3. **Does the policy include market mechanisms, regulations or incentives to boost 2010 energy productivity levels by 30 per cent by 2020?**

4. **Does the policy require transparency from listed companies and institutional investors with respect to the emissions profile of their assets and/or portfolios, and their exposure to the physical, regulatory and other climate-related risks?**

Figure 1. *Australian coal against the global coal budget.*



Prepare for Climate Impacts

Australia's climate is already changing rapidly. Extremes of heat and rainfall have risen in frequency and intensity over the last several decades, bushfire weather is worsening, southern Australia is becoming drier, and sea levels continue to rise.

Such is the momentum of change brought about by elevated greenhouse gas concentrations that the global climate system will continue to warm for decades to come. While it is still technically and economically feasible to hold global warming to below 2°C, current emissions trends put the world at risk of a rise in mean global temperature of around 4°C or more by 2100.

To date, government and industry policy responses to emerging climate risks are mostly fragmented and rely on historical data that are decreasing in relevance and reliability. There is an urgent need to identify and address gaps in adaptation to minimize the risks to life, property, and prosperity. This might include an examination of planning systems and building codes. Given the risks span all spheres of national life, a joined up approach to adaptation policy is warranted.

Policy benchmark. *Does the policy recognize the climate risks under 2- and 4-degree warming scenarios? Are these climate risks being introduced into all appropriate national policies, standards, targets and oversight?*

However, 2°C is not a benchmark of safety to aim for with severe impacts projected. Should global warming exceed 2°C, the risk of irreversible, nonlinear, cascading impacts will rise (Table 1).

The nation's health and prosperity rest on the viability of existing infrastructure, as well as that of long-lived assets yet to come, in the face of an increasingly hostile climate.

Modelling for the 2008 Garnaut Review conservatively estimated that the annual costs of unmitigated climate change on Australia's infrastructure would reach 0.5 per cent of GDP (about $9 billion) in 2020 and 1.2 per cent of GDP ($40 billion) in 2050.[25]

Businesses can bring down the costs of climate change (public and private) by preparing well in advance and building their resilience. Currently, there is very little recognition by most infrastructure asset owners of the direct (let alone the indirect) risks in a warming world. CSIRO[26] and other analysis by The Climate Institute have found that, at best, patchwork of responses is underway in key economic sectors (Table 3). In particular where there is government financial or policy support for private development, enabling the market to take account of emerging climate risks means properly assessing and being transparent about those risks is important.

Policy benchmark. *Does the policy require private-sector proponents or owners of infrastructure—especially those seeking Commonwealth approval or funding—to disclose how their assets and interdependencies will manage climate risks under 2 and 4 degrees of warming?*

The Australian Government can further catalyse a step-change in climate risk management, in other governments and in the private sector, by getting its own house in order. Progress ought to be subject to periodic review by the Australian National Audit Office.

With the loss of the National Climate Change Adaptation Research Facility there is a risk that years of research experience will be lost. There is a need for a national, properly funded authority charged with developing and coordinating a strategic approach to adaptation and resilience research; and ensuring new knowledge is freely available and taken up in relevant sectors. A priority is the identification of emerging climate risks for interdependent infrastructure assets and critical supply chains.

***Policy benchmark**. Does the policy establish the Commonwealth as a leader in climate risk management, in particular by (a) requiring all federal agencies to publish reports on their climate risk readiness 2 and 4 degrees warming scenarios; and (b) maintain a national body with responsibility for the coordination and public sharing of adaptation research?*

Preparing for climate impacts policy benchmarks:

1. **Does the policy recognize the climate risks under 2- and 4-degree warming scenarios? Are these climate risks being introduced into all appropriate national policies, standards, targets and oversight?**

2. **Does the policy require private-sector proponents or owners of infrastructure—especially those seeking Commonwealth approval or funding—to disclose how their assets and interdependencies will manage climate risks under 2 and 4 degrees of warming?**

3. **Does the policy establish the Commonwealth as a leader in climate risk management, in particular by (a) requiring all federal agencies to publish reports on their climate risk readiness 2 and 4 degrees warming scenarios; and (b) maintain a national body with responsibility for the coordination and public sharing of adaptation research?**

Table 3. Sector Snapshots. We have reviewed a number of key industry sectors that deliver essential economic and social infrastructure and services across Australia. The following table summarises these findings.[27]

Sector	Sample impacts	Action underway	Readiness rating
Water	Systems stressed by flooding Supply risks for water users	Coordinated action taking place Sector-wide collaboration on modelling impacts and responses Investigation of interdependencies with electricity and telecommunications	**Relatively advanced preparation**
Property 	Damage and destruction of property by flood, bushfire Degradation of foundations Impaired health and productivity	Widespread examples of early action but uncoordinated at industry and government levels Regulation and planning suffers from gaps, inconsistency, conflict across and within jurisdictions	**Early preparation**
Electricity 	Damage from flood/fire Strain/collapse in heatwaves Impaired health and productivity	Action is at early stages Examples of cooperation among networks Regulatory framework an obstacle to action	**Underprepared**
Road + Rail 	Flood-induced washouts Heat induced rail buckling, road cracking Impaired transportation of people and goods	Action is at early stages Fragmentation of responsibility an obstacle Regulation and planning suffers from gaps, inconsistency across and within jurisdictions	**Underprepared**
Financial Services	Insurers directly exposed to increasing costs of extreme events Investors exposed to impacts on assets	Action is at early stages Action not yet translated into market signals	**Underprepared**

Endnotes

[1] CO_2e - Carbon dioxide equivalent. CO_2e calculations take into account the impacts of the six major greenhouse gases considered under the Kyoto Protocol, not just carbon dioxide.
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[4] Professor Garnaut's emission pathway for Australia consistent with a 450 ppm-e stabilisation scenario saw emissions decline by 57 per cent on 2000 levels by 2030.
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[15] Global scenarios suggest equivalent global carbon prices of around $60/tonne by 2020, $80/tonne by 2030 and $160/tonne by 2050 are needed to achieve emission reductions that give a reasonable change of avoiding 2ºC increases on global temperature.
[16] Point Carbon, 2013, Analysts cut carbon price forecasts to 2020, http://www.pointcarbon.com/news/reutersnews/1.2323764
[17] Bloomberg New Energy Finance, 2013, *Global Renewable Energy Market Outlook 2013*, New York.
[18] Tim Nelson et al.,2012, *An analysis of Australia's Large Scale Renewable Energy Target: restoring market confidence*, AGL Working Paper 35, Sydney.
[19] Prime Minister Task Group on Energy Efficiency, 2010, *Report of the Prime Minister's Task Group on Energy Efficiency*, Government of Australia, Canberra.
[20] ClimateWorks Australia, *Industrial Energy Efficiency Data Analysis Project: Draft detailed results for comment*, Executive Summary, ClimateWorks Australia and Departmetn of Resources, Energy and Tourism, May 2013.
[21] ClimateWorks Australia, *Australian Carbon Trust Report: Commercial buildings emissions reduction opportunities* ClimateWorks Australia, December 2010; ClimateWorks Australia, *Low Carbon Growth Plan for Australia: Retail Sector Summary Report*, June 2011, ClimateWorks Australia June 2011.
[22] In Japan, their flagship energy efficiency *Top Runner* program, has been in operation since 1998. *Top Runner* standards are set to ensure the average efficiency of the rest of the market meets the performance level of most efficient products available (generally within three years). The standards have been revised and expanded, and now cover 21 types of products ranging from vehicles to electric rice cookers. To date, the program has seen energy efficiency improvements of between 16–80 per cent across the products covered.
[23] Carbon Tracker, the Grantham Research Institute on Climate Change and the Environment, 2013, *ibid*.
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